

Remarks/Arguments

Upon entry of the foregoing amendments, Claims 30, 31, 38, 39, 43, 44, and 48 to 61 will be pending in this patent application. Claims 30, 31, 38, 43, 50, 54, 57, and 61 have been amended, without prejudice, to more clearly describe the subject matter Applicants regard as their invention. No new matter has been added.

The Action includes rejections under 35 U.S.C. § 103(a). In view of the following remarks, reconsideration and withdrawal of the rejections are requested respectfully.

Discussion of the Rejection Under 35 U.S.C. § 103(a)

Claims 30, 31, 39, 44, 49, 51, 56, and 58 are rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over U.S. patent application Publication No. 2001/0055891 to Ko et al. ("the Ko publication") in view of the article C. Waldfried, et al., "Single Wafer RapidCuring™ of Porous Low-k Materials", IEEE (2002), pp. 226-228 ("the Waldfried reference"). Applicants respectfully traverse the rejection because one of ordinary skill in the art at the time of the present invention would not have been motivated to combine the teachings of the cited references in such a way as to produce the invention presently claimed.

The differences between Applicants' invention and the Ko publication are significant. Particularly, the Ko publication does not teach or suggest (1) a hydrocarbon porogen consisting of from 1 to 13 carbon atoms and less than or equal to $2n+2$ hydrogen atoms wherein n is the number of carbon atoms and (2) a porogen that is distinct from a structure-forming precursor.

It is widely accepted that hydrocarbon compounds consist of hydrogen and carbon atoms. For example, Hawley's Condensed Chemical Dictionary, 12th Ed., unequivocally states that a hydrocarbon is "an organic compound consisting *exclusively* of the elements of

carbon and hydrogen.” (emphasis added) Even common dictionaries define hydrocarbon as excluding elements other than carbon and hydrogen (*see, e.g.,* American Heritage Dictionary, 4th Ed., defining “hydrocarbon” as “any of numerous organic compounds, such as benzene and methane, that contain **only** carbon and hydrogen” (emphasis added)). Notwithstanding the fact that hydrocarbons are defined as having only hydrogen and carbon atoms, Applicants nevertheless have amended claims 30 and 31 to state that the hydrocarbon compound consists of from 1 to 13 carbon atoms and less than or equal to $2n+2$ hydrogen atoms wherein n is the number of carbon atoms.

In contrast to the claimed hydrocarbon porogen, the Ko publication teaches that its porogen “is an organic molecule **with a silyl group**, preferably at the end” (*see* page 3, paragraph [0036]). The Ko publication is also clear that, in addition to the silicon atom, the porogen also includes a reactive/functional group:

The pore-forming material is an organic molecules with a silyl group, preferably at the end. The organic part of the pore-forming material can be any organic aliphatic and/or aromatic hydrocarbon **containing organic linkage groups that can be decomposed at 200 ~ 500°C**, such as **ether** containing organic molecule, **ester** containing organic molecules, **amide** containing organic molecules, **carbonate** group containing organic molecules, **carbamate** group containing organic molecules, **anhydride** group containing organic molecules, **amine** group containing organic molecules, **enamine** group containing organic molecules, **imine** group containing organic molecules, **azo** group containing organic molecules, **thio-ether** group containing organic molecule, **sulfone** group containing organic molecules, **sulfoxide** group containing organic molecules, **isocyanate** group containing organic molecules, **isocyanurate** group containing organic molecules, **triazine** group containing organic molecules, **acid** group containing organic molecules, **epoxy** group containing organic molecules, and the like. Organic linkage groups may exist in linear chain and/or cyclic structure. The organic part of the component (b) may contain one functional linkage group or in combination of two or more thereof. The silyl part of the component (b) has at least one functional group to react with the component (a). The preferred functional groups are alkoxy (methoxy, ethoxy, propoxy etc.), acyloxy (such as acetoxy), hydroxyl, or halide (such as chlorine)

(see, page 3, paragraph [0036]) (emphasis added). Thus, the porogens of the Ko publication are **not** hydrocarbons **consisting of carbon and hydrogen** as recited in Applicants' claims because the disclosed porogens include a silicon atom.

Moreover, the Ko publication clearly teaches that the disclosed porogens are also **attached** to the structure-forming component:

As the component (b) a pore-forming material used in the present invention is radiation decomposable or preferably thermally decomposable. The radiation decomposable small molecules decompose upon exposure to radiation; e.g. ultraviolet, x-ray, electron beam or the like. **The thermally decomposable small molecules used as a pore-forming material having at least one silyl functional group at the end, so that a pore forming material can be connected by a covalent bonding with the component (a).** The pore-forming material component (b) may be mixed with partially hydrolyzed condensate prepared from the component (a), or it can be added when preparing a partially hydrolyzed condensate of the component (a). The pore-forming material is an organic molecules with a silyl group, preferably at the end

(see, page 3, paragraph [0036]) (emphasis added). Paragraph [0037] further confirms that the porogen disclosed by the Ko publication is connected to the structure-forming component and that a reaction occurs when the components are together in the presence of water and a catalyst:

The **cross-linking reaction** between the component (a) and the component (b) may take place in the state of the solution or during the state of forming the coating film. In present invention, a component (a) or a mixture of component (a) and (b) can be partially hydrolyzed and condensed in an organic solvent after addition of water and catalyst. **When the cross-linking reactions partially take place in the state of the solution to form uniformly distributed copolymer, the component (b) can be added to any state of hydrolysis and condensation of a component (a).** The component (b) can be also added to partially hydrolyzed condensate of component (a) before forming the coating film.

(emphasis added). Paragraph [0037] of the Ko publication expressly states that the cross-linking reaction between component and the porogen occurs either before or during the

formation of film coating. This teaching indicates that the attachment occurs during mixing, albeit the mixing may occur at different times during the film forming process. This teaching, however, does **not** suggest that the cross-linking reaction is optional.

Finally, the schematic diagram at page 5 of the Ko publication clearly illustrates pore formation by pyrolysis of Structural Formula I, which is silicon-containing molecule with a porogen attached thereto. Thus, the Ko publication teaches that its porogens **react** with the silicon precursor **when mixed**. Accordingly, the Ko publication does not disclose a mixture of a structure-former precursor and a pore-former precursor wherein the pore-former precursor is **distinct** from the structure-former precursor as is recited by Applicants' claims. Thus, for at least these reasons, reconsideration and withdrawal of the rejection in view of the Ko publication in combination with the Waldfried reference are requested respectfully.

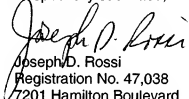
Claims 38, 43, 48, 50, 52 to 55, 57, and 59 to 61 are rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable either (a) over the Ko publication in view of the Waldfried reference, and further in view of U.S. patent application Publication No. 2003/0151031 to Li et al. ("the Li publication"), (b) over the Ko publication in view of the Waldfried reference, and further in view of U.S. patent application Publication No. 2005/0194619 to Edlestein et al. ("the Edlestein publication"), or (c) over the Ko publication in view of the Waldfried reference and further in view of the Li and the Edlestein publications. Since, as discussed above, the combination of the Ko publication and the Waldfried reference does not teach or suggest the basic invention, even if the Li and Edlestein publications disclosed the additional limitations of Applicants' dependent Claims 38, 43, 48, 50, 52 to 55, 57, and 59 to 61 (*arguendo*), their combination with Ko and Waldfried still would not render obvious the claimed invention. Accordingly, reconsideration and withdrawal of the rejection are respectfully requested.

Conclusion

Applicants believe that the foregoing constitutes a complete and full response to the Action of record. Applicants respectfully submit that this application is now in condition for allowance. Accordingly, an indication of allowability and an early Notice of Allowance are respectfully requested.

The Commissioner is hereby authorized to charge the fee required and any additional fees that may be needed to Deposit Account No. 01-0493 in the name of Air Products and Chemicals, Inc.

Respectfully submitted,


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